

TELECOMMUNICATION NETWORKS AY 2016/2017

Lecturer: MASSIMILIANO COMISSO

Outline of the course

Introduction to telecommunication networks. Standard bodies. Network classification. Services and protocols. Layered communication architecture. OSI reference model. Resource sharing: multiplexing and multiple access. Circuit switching and packet switching. Connection oriented e connectionless data transfer. Network topology.

Queuing systems. Poisson process. Birth-death processes. Little formulas. M/M/N/N+K queues. Erlang-B, Erlang-C. M/G/1 queue. Pollaczek-Khintchine. Priority systems (preemptive, non-preemptive).

Circuit switching telephone network. Switching networks. PCM signal. Plesiochronous (PDH) and Synchronous (SDH) hierarchy. Data transmission: xDSL standard.

Mobile communication. Cellular networks. Reuse factor. GSM architecture. Logical channels, frequency hopping, time advance, ciphering, handover. Subsequent generations (outline): GPRS, UMTS, LTE, 5G.

Data link layer. Framing. Flow and error control. multiple access.

Error control. Parity check codes, repetition codes, CRC. Automatic Repeat reQuest (ARQ: stop and wait, go-back-N, selective repeat).

Multiple access. Coordinated access: token passing. Random access: Aloha, CSMA. IEEE 802 project. Local Area Networks: Ethernet, spanning-tree algorithm, WiFi. WiMAX, Bluetooth, ZigBee (outline).

Network layer. Routing algorithms: classifications. Dijkstra algorithm. Bellman-Ford algorithm and poisoned reverse.

Packet Switching. ATM: stack, Connection Admission Control, Usage Parameter Control. Traffic Shaping, ATM layer, Adaptation Layer. Internet: stack, TCP, UDP, congestion control, IP addressing, CIDR, organization.